REMARKS

I. Rejection of Claim 25 and claims dependent thereon under 35 U.S.C. §102(e) over WO 02/071518

Claim 25 and claims dependent thereon stand rejected under 35 U.S.C. §102(e) as being anticipated by WO 02/071518 (" '518 publication").

The Examiner stated that the instant application is not entitled to the claimed priority to the German Application 102 39 701.5, filed on August 29, 2002, because the certified English translation of the priority document has not been submitted.

Applicants submit herewith an English translation of the specification of German patent application 102 39 701.5, filed on August 29, 2002, certified by Neil Thomas Simpkin, BA of RWS Group Ltd UK Translation Division.

With the submission of the certified English translation of the priority document, the '518 publication is no longer available as a prior art reference. As Applicants argued earlier, the '518 publication was published in German, on September 12, 2002, therefore it is available under U.S. Patent law as prior art ***only*** as of its publication date. Instant Application claims priority to the German Application 102 39 701.5, filed on August 29, 2002. Since the publication date of the '518 publication is subsequent to the earliest priority date of the instant application, the '518 publication does not constitute prior art under 35 U.S.C. §102(e) or 35 U.S.C. §102(a).

In the view of the above, Claim 25 is novel over the '518 publication. Claims 26-46 and 48-51 depend directly or indirectly on independent Claim 25 and, therefore, are also novel.

Reconsideration and withdrawal of the rejection are respectfully requested.

II. Rejections of Claim 25 and claims dependent thereon over WO 02/36249 and EP 0265921

(1) Claim 25 and claims dependent thereon are patentably distinct over the cited references

The Examiner maintained the rejections of Claim 25 and claims dependent thereon under 35 U.S.C. §102(a) and §102(e) as being anticipated by WO 02/36249 ("the '249 application") and under 35 U.S.C. §102(b) as being anticipated by EP 0265921 ("the '921 application") for the reasons stated in the previous Office Action. Additionally, the Examiner stated that the

Applicants prior argument for patentability of these claims is based on the steps of a process, while the claims are drawn to the product. The Examiner requested evidence of unexpected advantages of using the steps of the process recited in Claim 25.

Applicants disagree with the Examiner's position. Applicants direct the Examiner to M.P.E.P. §2113:

> The structure implied by the process steps should be considered when assessing the patentability of product-by-process claims over the prior art [...] (*Emphasis added.*)
>
> [...]
>
> The correct inquiry [...] is whether the product defined by claim 1 is patentably distinguishable over the [*cited references*] in view of the structural limitation [...] (*Ibid.*) (*Emphasis added.*)

In other words, for the product-by-process Claim 25 to be patentably distinct over the referenced patents, it is only required that the structure formed as a result of performing the steps recited in Claim 25 (*i.e.*, a polymer film based on polyazoles) be different from and non-obvious over that of the cited references. As Applicants argued in their response to the previous Office Action, Claim 25 satisfied the requirements of patentability delineated in M.P.E.P. §2113.

Applicants recapitulate their position.

(2) Rejection of Claim 25 and claims dependent thereon over WO 02/36249

Claim 25 and claims dependent thereon are rejected under 35 U.S.C. §102(a) and §102(e) as being anticipated by WO 02/36249 (" '249 application"). Specifically, the Examiner stated that '249 application discloses a single-layered or multi-layered plastic membrane doped with acid. The layer disclosed in the '249 application is comprised of a polyazole disclosed in the instant application (the '249 application, formula 1C at page 6 and Claim 3 at page 19).

The membrane disclosed in the '249 application is different than the product produced by the claimed process of the instant application. The '249 application membrane is doped with acid; the presence of the acid in the membrane is stated to be important for the improved mechanical and physicochemical properties of the membrane, for example, good proton

conductivity[1] (see Exhibit A, page 1, paragraph 8). Exhibit A further states that that "the doped polymer membranes are polymer membranes which due to the presence of dopants display an increased proton conductivity compared to the undoped polymer membranes" (Exhibit A, page 4, paragraph 45). Furthermore, Exhibit A teaches that increasing the degree of doping increases the conductivity of the material, and consequently, a doping of 6-12 mole of acid per mole of repeat unit is preferred (Exhibit A, page 4, paragraph 47 and Table 1). Exhibit A further states that the preferred dopant is phosphoric acid (Exhibit A, page 4, paragraph 46).

In contrast to the membranes of the '249 application, Claim 25 requires "removing the polyphosphoric acid or phosphoric acid present and drying" (see Step F). Thus, the film that results from practicing the steps recited in Claim 25 is different from the film of the '249 application because Step F removes the phosphoric acid that corresponds to the dopant of the '249 application. As a result of the method by which it is produced, the undoped film of the instant invention has a porous structure that is morphologically different from that of the film disclosed in the '249 application, in which the film is doped with acid (see, for example, instant application, page 19, lines 6-7).

For the above reason alone, Claim 25 is novel in view of the '249 application. Moreover, Claim 25 now recites that the polyazole polymer formed has an intrinsic viscosity of at least 1.4 dl/g. The '249 application does not teach the intrinsic viscosity of the polymeric films formed therein. Therefore, Claim 25 is novel in view of the '249 application.

Claim 25 is also non-obvious in view of the '249 application because the instant application selects a polyazole polymer with an intrinsic viscosity of at least 1.4 dl/g, which corresponds to the selection of a high molecular weight polyazole polymer. These high molecular weight polyazoles of the instant application have unexpected advantages in mechanical properties and are, therefore, non-obvious in view of the '249 application.

Intrinsic viscosity is defined by IUPAC as:

> **intrinsic viscosity (of a polymer)**
> The limiting value of the *reduced viscosity*, η_i/c, or the *inherent viscosity*, η_{inh}, at infinite dilution of the polymer, i.e.
>
> $$[\eta] = \lim_{c \to 0} (\eta_i/c) = \lim_{c \to 0} \eta_{inh}$$

[1] With their response to the last Office Action, Applicants presented Exhibit A, which is U.S. Application Number 10/399,514, the U.S. National Stage Application of the '249 application.

Here, c is the concentration of a polymer, and η_i is the *relative viscosity increment*, defined by IPUAC as the ratio of the difference between the viscosities of solution and solvent to the viscosity of the solvent[2].

Intrinsic viscosity is related to molecular weight by the Mark-Houwink equation[3]. As can be seen from the Mark-Houwink equation, intrinsic viscosity η is directly proportional to the molecular weight M. Thus, the higher the intrinsic viscosity of a solution of a solute, the higher the molecular weight of the solute that is dissolved in the solution.

Selection of materials with high molecular weight (as evidenced by higher intrinsic viscosity) results in unexpected improvements of the mechanical properties of the claimed polymer film of the instant application. For example, advantages of the high molecular weight claimed process polymer films of the invention include long-term stability and product life, and improved separation behavior (instant application, page 18, lines 29-31). Additionally, the claimed polymer film do not contain impurities which require high cost to remove (instant application, page 18, line 32-33).

In the view of the above, Claim 25 is novel over the teachings of the '249 application because (a) the polymer films of the '249 application are doped with a dopant, such as phosphoric acid, and therefore different than the undoped as well as porous polymeric film defined by Claim 25; and (b) because the '249 application does not teach the selection of high viscosity, and thus high molecular weight, materials, as required by Claim 25.

Furthermore, the high molecular weight polymer films defined by Claim 25 have unexpected improved mechanical properties. Therefore, Claim 25 is non-obvious over the teachings of the '249 application. Claims 26-46 and 48-51 depend directly or indirectly on independent Claim 25 and, therefore, are also novel and non-obvious.

Reconsideration and withdrawal of the rejection are respectfully requested.

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[2] With their response to the last Office Action, Applicants presented Exhibits B and C. Exhibit B is a printout of URLs http://www.iupac.org/goldbook/I03140.pdf and Exhibit C is a printout of http://goldbook.iupac.org/R05283.html, both last accessed on December 2, 2008.

[3] With their response to the last Office Action, Applicants presented Exhibit D, J. Brandrup and E.H. Immergut, Polymer Handbook, 3rd Ed., Wiley Interscience (1989), pp. VII/1, and Exhibit E, a Guide on Determination of Molecular Weight, downloaded from the website run by the University of California College of Engineering, at URL http://www.eng.uc.edu/~gbeaucag/Classes/Characterization/MolecularWeighthtml/MolecularWeight.html (last accessed December 2, 2008).

(3) Rejection of Claim 25 and claims dependent thereon over EP 0265921

Claims 25 and claims dependent thereon are rejected under 35 U.S.C. §102(b) as being anticipated by EP 0265921 ("the '921 application"). Specifically, the Examiner stated that the'921 application reference discloses an organic optical component comprising a medium of polybenzimidazole, which is a polyazole disclosed in the instant application (page 3, last formula, page 7, Example II and Claim 8).

The membrane disclosed in the '921 application is different than the membrane defined by Claim 25. The '921 application discloses optical devices with an organic non-linear optical film. The '921 application discloses in Example II that the preparation of polybenzimidazole (PBI) polymers is done using two-stage solid polymerization process (on page 7, lines 26-57). The resulting PBI has a *low* molecular weight (reported as inherent (intrinsic) viscosity of 0.95dl/g, when prepared with a catalyst (page 7, line 51) or 0.56 dl/g, when prepared without a catalyst (7, line 56)).

In contrast to the '921 application, the instant invention provides a new class of polymer films based on polyazoles. Claim 25 now recites that the polyazole polymer formed has an intrinsic viscosity of at least 1.4 dl/g. The intrinsic viscosity of the polymer films disclosed in the '921 application are lower (*e.g.* 0.56 - 0.95 dl/g) than the polymeric films formed from the claimed process. Therefore, the polymer films of the '921 application are different than the polymer films of the instant application. Moreover, the '921 application does not teach removal of acid to generate membrane films that possess a porous morphology. For the reasons above, Claim 25 is novel in view of the '921 application.

Claim 25 is also non-obvious in view of the '921 application because the materials defined by Claim 25 are a selection of a polyazole polymer with an intrinsic viscosity of at least 1.4 dl/g, which corresponds to the selection of a high molecular weight polyazole polymer. These high molecular weight polyazoles have unexpected advantages in mechanical properties and are, therefore, non-obvious in view of the teachings of the '921 application.

As discussed above, the high intrinsic viscosity corresponds to a high molecular weight of the polyazole polymer formed by the process recited in Claim 25. Selection of the high molecular weight polymer results in unexpected improvements of the mechanical properties of the claimed polymer film. For example, advantages of the high molecular weight polymer films

of the invention include long-term stability and product life, and improved separation behavior (instant application, page 18, lines 29-31). Additionally, the claimed polymer film do not contain impurities which require high cost to remove (instant application, page 18, line 32-33).

In the view of the above, Claim 25 is novel over the '921 application because the polymer film of the '921 application are of a lower molecular weight. Additionally, the films of the '921 application are not treated to remove any acid present to produce a membrane with a porous morphology as is the result of practicing the steps recited in Claim 25. Therefore, the membranes defined by Claim 25 are different than the films of the '921 application.

Additionally, the high molecular weight polymer films of Claim 25 have unexpected improved mechanical properties. Therefore, Claim 25 is non-obvious over the teachings of the '921 application. Claims 26-46 and 48-51 depend directly or indirectly on independent Claim 25 and, therefore, are also novel and non-obvious.

Reconsideration and withdrawal of the rejection are respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all claims are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,

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